

Some Asiatic Sedums in the Edinburgh Herbarium; with supplementary notes from Kew and the British Museum.

BY

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With Plates CLXX-CLXXIX and One Figure in the Text.

THE majority of the sheets of the large collection of Asiatic Sedums preserved at Edinburgh have been examined by M. Hamet, and his determinations have been published in part.* The present notes deal with the remainder of the Asiatic sheets, including G. Forrest's more recent collections in Yunnan made after 1913, and some interesting Chinese and Burmese plants obtained by F. Kingdon Ward and Reginald Farrer. It has been found necessary to review a few of M. Hamet's determinations, in most cases because I regard as distinct a few plants which he had placed, in most cases tentatively, under species already described. A similar revision has been made in the case of a few of the plants of Forrest's first expedition, as published by Diels.†

An examination of the Sedums in the Léveillé Herbarium (now at Edinburgh) and of Hamet's comments on these plants reveals the identity of some of Léveillé's very inadequately described species, and furnishes other useful material. One of the Léveillian species (*S. Chaneti*), which could not be identified from his description, proves to be identical with a plant subsequently described by myself as *S. pyramidale*. My name is in consequence withdrawn, but my description will be found useful. The issue was confused in this case by the fact that (on Hamet's determination, as the label on the specimen shows) Léveillé had withdrawn this species, identifying it with *S. spinosum*, Thunberg, a quite different plant. Two other names of mine, *S. Mairei* and *S. triphyllum*, are also withdrawn, specimens in the Léveillé collection named by Hamet showing that they are identical with his *S. Someni* and *S. Chauveaudi* respectively.

* Notes Roy. Bot. Gard. Edin., v, 115; viii, 140.

† Ibid. vii.

In the present paper 12 new species are described and figured, of which 8 belong to the section *Rhodiola*, which is essentially Asiatic in distribution, and is proving to be extensively developed in the W. China-Tibet region, and to offer there many interesting and puzzling forms. The additional members of it now studied have not led me to alter the tentative views I expressed in a recent paper * as to the extent and classification of this difficult and complicated group. At the one end of the series, which I take to be the most evolved, stand *S. roseum* and its allies; at the opposite end the Rhodiolas appear to pass into the *Seda Genuina*, forms like *S. limulooides* having affinities in its growth-form (on which the classification of Sedums has always been based, the flowers providing no sure ground for sub-division) to Rhodiolas like *S. Praegerianum* and *S. Balfouri* on the one hand, and on the other to some of the Mexican *Seda Genuina*.

The following notes relate only to sheets now for the first time determined, or of which previous determinations are revised. Plants which were already correctly named in the collections are not included, except where, as in the case of *S. Leveilleanum* or *S. orichalcum*, their characters and affinities are discussed. I have not included additional stations for certain species which are now known to be of common occurrence in the areas concerned.

The information given on the labels is given verbatim, any additional remarks by myself being included in parenthesis.

S. alboroseum, Baker.

- (1) Shangtung : I-tu-ksien, Ching-chou-fu. Reed, 1895. Coll. S. Couling, No. 69. Hsieh tsu tsao. Cures scorpion bites.
- (2) Shangtung : Taian-fu, T'ai Shan Mountains, September 1912. Mary Strong Clemens, No. 1395. (As *S. Telephium*).
- (3) Chihli : Tientsin, Oct. 7, 1912. Mary Strong Clemens, No. 1810. "Pink flowers in our compound." (As *S. Telephium*).

S. Alfredi, Hance.

- (1) Yunnan : Sedum vivace. Fl. jaunes. Rochers mousseux, vallée de Long-ky, alt. 700 m. Septembre. E. E. Maire.
- (2) Kiangsi : Kewkiang Hills, 22 May, '92. Yellow flower. Herb. of W. R. Carles, No. 174.

In the first-mentioned plant (Maire) the inflorescence is very strong, and the leaves, while frequently normal (as figured in Proc. R. Irish Acad. xxv, Sect. B. pl. iii), tend to be shorter and broader, with a retuse, not pointed, apex. In the latter sheet (Carles) these features are emphasised, all the leaves being

* Trans. Bot. Soc. Edin. xxvii, 107.

retuse and only twice as long as broad, instead of thrice or more. The leaves are moreover opposite, not alternate as they are normally, but the flowers are typical. A similar tendency to retuse apices in leaves normally of very similar shape is found in the Mexican *S. oxyptetalum*, H.B.K.

S. algidum, Ledeb.

(1) Szechuan : Herb 6"-1 ft. Flowers whitish, midst rocks around Tachien-lu, W. Szechuan. Alt. 13,000-14,500 ft. 9.08. E. H. Wilson, No. 2498. (Under *S. algidum*, but flowers unusually small).

(2) Yunnan : vivace, naine, fl. jaunes. Pâturages du Io-chan, alt. 3300 m. Juin. E. E. Maire, No. 680. 1914. (A small form with unusually small flowers).

(3) Yunnan : Vivace. Tiges et fleurs jaunes. Pâturages de Ta-hai, alt. 3200 m. Juillet. E. E. Maire, No. 262/1913. (A large plant with the narrow leaves and long stamens of var. *tanguticum*, Maxim. but the short ovaries in the male flower of var. *jeniseense*, Maxim.)

S. algidum, Ledeb., var. *tanguticum*, Maxim.

(1) Szechuan : West Szechuan and Tibetan frontier; chiefly near Tachien-lu, at 9000-13,500 ft. Coll. A. E. Pratt, No. 105. (As *S. asiaticum*, DC.) (There is a sheet of the same gathering at Kew).

(2) W. China : Sedum. Wet rocks, 11-12,000 feet. 7.03. E. H. Wilson, No. 3620.

Sedum ambiguum, Praeger, sp. nov. (Plate clxx, 1).

Species anomala sectionis Sedorum Genuinorum caudice elongato ut in *Rhodiola insignis*, sed caudicis apex nanus, nec squamosus. *S. Ewersii*, Ledeb. et speciebus nonnullis aliis sectionis Telephii subsimilis, sed radices non tuberosae. Foliis crassissimis rosulatis, petalis erectis atque staminibus quinque *S. indicum*, Hamet subsimilis, sed habitu perenni (nec bienni), sepalis quam petala longioribus vel ea aequantibus (nec multo brevioribus), squamis nectariferis minutis semi-ellipticis integris (nec amplis oblongo-quadratis emarginatis) differt.

Herba perennis, glabra, carnosissima, caules steriles edens. *Radices* fibratae. *Caudex* ramosus, ramis 3-6 cm. longis, gracilibus, 3 mm. crassis, argenteis, hypogeis, decumbentibus vel adscendentibus. *Rami* steriles laterales, breves, apice folia in rosulas disposita ferentes. *Rami* floriferi terminales, erecti, simplices, graciles, sparsim foliosi, 7-10 cm. longi. *Folia* *ramorum* sterilium plana, alterna vel opposita, conferta, sessilia, in-

tegra, carnosissima, orbicularia vel orbiculari-obovata vel orbiculari-rhomboidea, apice rotundata vel apiculata, 9–12 cm. longa et lata, supra et subtus in sicco valde argentea. *Folia ramorum floriferorum* alterna vel opposita, plana, sessilia, integra, internodiis breviora, oblanceolata vel oblonga, apice obtusa, 7–9 mm. longa, 1.5–3 mm. lata. *Inflorescentia* corymbiformis, laxa, 12–25 mm. longa, 25–35 mm. lata, sparsim bracteata; bracteae foliis similes sed minores, linearis-oblongae, obtusae. *Flores* hermaphroditici, 5-meri, anguste campanulati, 4 mm. longi, in vivo pulchre rosei, in sicco pulchre purpurei, pedicellati; pedicelli floribus plerumque longiores, sursum incrassati, purpurei. *Sepala* fere libera, aequilonga, erecta, carnosissima, oblongo-linearia, obtusa, 3.5–4 mm. longa, (raro 2.5–3 mm. longa), .75–1 mm. lata. *Petala* sepalis plerumque breviora, raro ea aequantia, erecta, ovato-deltoides, acuta, 2.5 mm. longa, 1 mm. lata. *Stamina* 5 episepala, antheris amplis .7 mm. longis, filamentis 1.3 mm. longis, longissime deltoideis. *Squamae nectariferae* minutae, semi-ellipticae, integrae, .5 mm. longae et latae. *Carpella* robusta, erecta, 2 mm. longa, stylis brevibus erectis capitellatis.

(1) Yunnan : Mekong Valley, arid region, 7000 feet. June 1913. F. Kingdon Ward, No. 391.

(2) Yunnan : Mekong Valley. Lat. 28° 30' N. Alt. 6000–7000 ft. June, 1917. Plant (succulent) of 3–5 inches. Flowers bright rose. Open dry rocks and rocky slopes. G. Forrest, No. 15,049.

(3) Szechuan : Szechuan austr. reg. Knapic prope Tatiao Ko, in rupestr. calc.; fl. rubri et paullo violacei. May 23, 1914. Alt. circiter 2800 m. C. Schneider, No. 1362.

A curious plant, apparently nearest to *S. indicum*, Hamet. The material is poor as regards the barren shoots, the indications are that they continue growing slowly with rosulate foliage probably for more than one year, and then shoot up, flower, and die, being replaced by offsets at their base; this growth-form is close to that found in the Mexican Sedums of the group *Sedastrum*, Rose, which the present plant also matches in its broad, entire, very fleshy leaves. The plant is known by its very fleshy, round leaves, silvery on both sides when dry, bright rose flowers and pedicels (bright purple when dry) and oblong, erect sepals exceeding or equalling the erect petals. The bright red coloration of the inflorescence—unusual in the *Seda Genuina*—is caused mainly by the high pigmentation of the sepals and pedicels.

In the general form of the flower and in its five stamens in particular the plant recalls *S. indicum*, especially the curious form named var. *Forrestii* by Hamet, which has similarly some of the leaves nearly orbicular and opposite; it is a tall, straggling plant of which the only specimen looks like a perennial. But

it has the characteristic short deltoid sepals of *indicum*, not the oblong sepals at least equalling the petals of *ambiguum*. I grew for some years *indicum* and its vars. *yunnanense* and *densirosumatum*, and the flowers displayed no marked variation in respect to their sepals, and they were uniformly biennial, forming a *Sempervivum*-like rosette in the first year and a central flowering stem in the second.

S. angustum, Maxim.

N.W. Yunnan : A-tun-tsü. Dry shrub belt, 12,000–13,000 feet. 17.8.13. F. Kingdon Ward, No. 1051.

Sedum atuntsuense, Praeger, sp. nov. (Plate clxx, 2).

Habitu *S. quadrifidi*, Pall., sed foliis latis (nec linearibus) valde differt. Ab *S. fastigiato*, H.f. et Thoms. foliis oblongo-ovatis basi cuneatis (nec linearibus nec oblongo-lanceolatis basi latis) distinguitur. *S. venusto*, Praeger (*infra*) subsimilis, sed statura minore, staminibus brevioribus vix adnatis, squamis semi-ellipticis integris (nec subquadratis emarginatis) distincta. *S. gelidum*, Ledeb. foliis oblongis plerumque dentatis, staminibus alte adnatis, squamis emarginatis differt. *S. Bouvieri*, Hamet caulis foliisque papillis longis obtectis facile separandum.

Herba perennis, glabra, caules steriles non edens. *Caudex* erectus, pauciramosus, 3–5 cm. longus, 12 mm. latus, caulis emarcidis obtectus, apice caules floriferos basi squamis cinctos ferens. *Squamae* deltoideo-semiorbiculares, acutae, paleaceae. *Caules* annui, multi, simplices, erecti, glabri, teretes, foliosi, circa 4 cm. longi. *Folia* alterna, glabra, internodiis breviora, sessilia vel subpetiolata, oblongo-ovata vel late oblongo-lanceolata, marginibus integris, apice obtusa, basi cuneata, in calcar non producta, circa 6 mm. longa, 2.5 mm. lata. *Inflorescentia* terminalis, densa, subumbellata, involucrata e ramulis circa 5 unifloris quam flores paulo brevioribus bracteis nonnunquam fermentibus composita. *Flores* hermaphroditici, 5-meri, pulchre lutei. *Calyx* 2.5–3.5 mm. longus, segmentorum parte libera 1.5–2.5 mm. longa basi 1 mm. lata lineari vel lanceolata, obtusa. *Petala* suberecta, oblonga vel oblongo-lanceolata, obtusa, 3.5–4.5 mm. longa, 1 mm. lata, parte concreta brevissima, nervo medio in mucronem apicem superantem prolongato. *Stamina* petala aequantia, epipetalorum parte adnata .5 mm. longa. *Squamae nectariferae* circa 1 mm. longae, semi-ellipticae, paulo longiores quam latiores, minute emarginatae. *Carpella* erecta, oblonga, cum stylis 2.5 mm. longa : styli 1 mm. longi.

(1) N.W. Yunnan : A-tun-tsü, alpine rocks, 14–15,000 feet. 1911. F. Kingdon Ward, No. 37.

(2) A-tun-tsü : screes, 16,000 feet. Flowers yellow, cushion. 6.8.13. F. Kingdon Ward, No. 962.

Sedum Barnesianum, Praeger, sp. nov. (Plate clxxi, 1).

Sectionis Rhodiolae species humilis e serie Primuloides Praeger, quae caudicis foliis bene evolutis distinguitur. *Sedo Levii*, R. Hamet est proxima, sed caudicis squamis longe deltoideis nullis, caudicis foliorum lamina linearis-rhomboidea (nec ovata), ramis floriferis horizontalibus (nec erectis), foliis ramorum floriferorum linearibus (nec ovato-oblongis), sepalis caudato-acuminatis (nec acutis), petalis caudatis (nec obtusis), squamis nectariferis quadratis (nec duplo latioribus quam longioribus) distinguitur.

Herba perennis, glabra, ramis sterilibus nullis. *Caudex* erectus, simplex, brevis, crassus, 1-2 cm. longus, ad 1 cm. latus, foliis ramisque floriferis et emarginatis et vivis coronatus. *Caudicis foliorum emarginatorum* laminae dilapsae, petioli persistentes, erecti, lineares, plani, truncati, nigrescentes, annulum densum circum gemmulam formantes. *Caudicis folia viva* pauca (4-8), erecta, petiolata, integra; petiolus linearis, planus, 9 mm. longus, .75 mm. latus, basi paulum dilatatus; lamina linearis-oblanceolata vel linearis-rhomboidea, acutiuscula, 6 mm. longa, 1.5 mm. lata. *Rami floriferi* pauci (2-6), simplices, graciles, 2.5 cm. longi; parte inferiore nudi, erecti, parte superiore foliosi, horizontales, apicibus adscendentibus. *Rami floriferi* vetusti subpersistentes, adscendententes. *Ramorum floriferorum* *folia conferta*, sessilia, integra, plana, linearis-rhomboidea, subacuta, 4-5 mm. longa, 1 mm. lata, apice et basi angustata. *Flores* solitarii, hermaphroditi, 5-meri, campanulati, albi vel albidi. *Sepala* libera, ovato-oblonga, caudato-acuminata, viridia, 3 mm. longa, 1.5 mm. lata. *Petala* libera, suberecta, ovata, apice caudata, 4.5 mm. longa, 2 mm. lata. *Stamina* 10; epipetala 3 mm. longa; epipetala 2.5 mm. longa, triente adnata. *Squamae nectariferae* quadratae, .75 mm. longae et latae, apice subretusa. *Carpella* erecta, gracilia, rubescens, in stylos breves attenuata, 2.5-3 mm. longa.

(1) Himalaya : Kalaeree, East Himalaya, 16,000 feet. 12.9.12. Coll. Rohmoo Lepcha, No. 434.

(2) Phari, Chumbi Valley, East Himalaya. 14,000 feet. 20.9.16. Coll. Native Collector.

This little plant is an addition to the interesting group of Sedums of which *S. primuloides*, Franch. and *S. Praegerianum* W. W. Sm. are examples, and which, as I have endeavoured to show,* belongs to the section Rhodiola and consists of primitive

* Praeger (R. Ll.), Trans. Bot. Soc. Edinb. xxvii, 107.

forms in which the caudex-leaves have not degenerated into scales, as in the better known members of the section. It is thus allied to *SS. Praegerianum*, W. W. Sm., *Mossii*, Hamet, *Levii*, Hamet, *Karpelesae*, Hamet, *Hobsonii*, Hamet, *Durisii*, Hamet, *Balfouri*, Hamet, *primuloides*, Franch., *pachyclados*, Aitch. and Hemsl., and *Leveilleanum*, Hamet, but is easily distinguished from all of these. Thus, *pachyclados* and *primuloides* have slender elongate branched caudices (not very short, thick, simple); *pachyclados*, *primuloides*, *Karpelesae*, *Levii* and *Durisii* have caudex-leaves with a very broad (not linear-rhomboid) lamina, and in the last-named the leaves are pilose (not glabrous); *Karpelesae* has stem-leaves subverticillate (not alternate); *Balfouri* and *Mossii* are much taller plants with flower-stems respectively 30 and 10 cm. (not 2.5 cm.) long, and in the former the leaves are ciliate; *Hobsonii* has ovate-oblong (not linear-rhomboid) caudex-leaves, and it and *Levii* have ovate (not linear-lanceolate) stem-leaves; *Leveilleanum* has broader cuspidate (not subacute) caudex-leaves and many erect (not few horizontal) flower-stems; *Praegerianum* is a plant 3–4 times as large with caudex bare of old leaves and very erect red petals. *S. Barnesianum* resembles *Leveilleanum* and *Levii* in its dense external ring of dead leaves, but in the former the whole leaf (not merely the petiole) is persistent, and in the latter the deciduous lamina is ovate (not linear-rhomboid). It resembles *Karpelesae* and *Levii* in its solitary flowers, all the other members of the group having several or many flowers on each stem. It resembles *Praegerianum* in habit, especially in its horizontal flower-stems.

The species is dedicated to Miss Eileen Barnes, to whose industry and skill I owe drawings of nearly two hundred species of *Sedum*.

S. Beauverdi, Hamet.

(1) Yunnan : Hills around Tengyueh. Lat. 25° N. Alt. 6000 feet. Tufted plant of 1–2 inches. On dry rocks. July 1912. Forrest, No. 8323.

(2) Yunnan : Tali Range. Lat. 25° 40' N. Alt. 11,000 feet. Tufted plant of 2–3 inches. Flowers brassy-yellow. Ledges and crevices of cliffs and on humus-covered boulders. Sept. 1913. Forrest No. 11,711.

S. Bergeri, Hamet.

"Yunnan : Leg. Ducloux. 2263. Herb. Mus. Paris."

S. bhutanicum, Praeger, nom. nov.

S. Cooperi, Praeger (1919) nec Clémenc. (1868).

(1) Himalaya : Kapup, Sikkim. Alt. 12,000 feet. 5.7.13. Yellow, among stones and gravel. Cooper, No. 166.

(2) Himalaya : Guicha-La, E. Himalaya, 16,000 feet. 12.8.13. Coll. Rohmoo Lepcha, No. 1002.

(3) Himalaya : Palansgarh, Byans, about 10,000 feet. July 19, 1886. Presented by J. R. Reid. (As "*Sedum ? Rovyleii*"—*a nomen nudum*).

(4) N.W. Yunnan : On rocks, 13,000 feet, A-tun-tsü. 1913. F. Kingdon Ward, No. 564 (in part).

(5) Yunnan : Forrest, No. 2492. (See *supra* v, p. 120, where it is recorded as *S. bupleuroides*, Wall. by Hamet; also *supra* vii, p. 135, where it is named *S. bupleuroides*, Wall. (?) by Diels).

(6) N.W. Yunnan : Mountains north of A-tun-tsü. Lat. 28° 35' N. Alt. 14,000 feet. Plant of 2-4 inches. Flowers deep dull crimson. On humus-covered boulders in shady situations. G. Forrest, No. 14,071.

The following additional records are included here with some doubt. The *bupleuroides* group, to which *S. bupleuroides*, *S. bhutanicum*, and *S. discolor* belong, is difficult, and the species (as is the way of Rhodiolas) offer no constant characters by which they may be separated readily in all cases :—

(7) N.W. Yunnan : A-tun-tsü. On rocks, 13,000 feet. 1913. F. Kingdon Ward, No. 564. (Poorly developed, probably shade grown. Leaves small and shortly stalked and rootstock slender, in these characters approaching *S. discolor*).

The following are in Herb. Kew :—

(8) Chumbi—Kangboo, 2 Aug. 1882. Flowers pink. Coll. Dungboo.

(9) Phari. July 1879. Fl. orange. Coll. Dungboo. (In these two gatherings the leaves are narrower than in type and glaucous below, approaching *discolor*. But they have the moderately thickened rootstock which belongs to *S. bhutanicum*.

S. Bouvieri, Hamet.

(1) Himalaya : Sedum sp. n. Height above Chahlek, Byans, about 12,000 feet. July 23, 1886. Pres. by J. R. Reid, C.I.E.

(2) W. Nepal : Sedum sp. n. Rocks in Nampe Gadh, Nepal. 13,000 feet. 27.7.86. J. F. Duthie, Coll. No. 5565.

There is a sheet of the second gathering in the Kew Herbarium, accompanied by good drawings of the female flower by Miss M. Smith. It is labelled, "Sedum near *linearifolium*"; to which is added, "Rather *S. coriaceum*, Wall.—J. F. D."

S. bracteatum, Diels.

(1) Yunnan : Plante annuelle tendre. Fl. jaunes. Vallons

humides boisés de To-ch'an. Alt. 3200 m. Août. E. E. Maire, No. 1016/1913.

(2) Yunnan: Western flank of the Shweli-Salwin divide. Lat. $25^{\circ} 20'$ N. Alt. 10,000 feet. Plant of 3-6 inches. Flowers yellow. On rocks. August 1912. Forrest, No. 8982.

(3) Yunnan: Mountains in the N.E. of the Yangtze bend. Lat. $27^{\circ} 45'$ N. Alt. 10,000 feet. Plant of 4-8 inches. Flowers golden-yellow. Open shady situations on rocks. Aug. 1913. Forrest, No. 10,954.

(4) Upper Burma: Fls. bright yellow. On shady banks with other undergrowth, forest, 10,000 feet. 12.8.14. Hpimaw Pass. F. Kingdon Ward, No. 1878.

(5) Upper Burma: Hpimaw Pass. Alt. 10,500 feet. June 13, 1919. Sedum sp. Damp cool moss banks near Hpimaw Pass. R. Farrer, No. 1026.

S. Celiae, Hamet.

Three gatherings from Tong-tchouan, alt. 2600-2700 metres. E. E. Maire.

S. Chauveaudi, Hamet.

(1) Shantung. Rev. Alex. Williamson, 1864.

(2) Yunnan: Sedum vivace. Fl. jaunes. Rochers au pied des montagnes à Tong-tch'ouan Alt. 2550 m. Oct. E. E. Maire, No. 601/1913.

(3) Yunnan: Sedum annuelle. Fl. jaunes d'ocre. Toitures et tertres à Tong-tch'ouan. Alt. 2500 m. Novembre. E. E. Maire.

Sedum concinnum, Praeger, sp. nov. (Plate clxxii, 2).

Species e grege Rhodiola, *S. roseo*, Scop. subsimilis sed minuta; caudicis squamis imbricatis regulariter dispositis, caulinis dense mammillatis pollicaribus, foliis obovatis inferioribus integris superioribus saepe margine sinuosis, cymis paucifloris notata.

Herba perennis, glabra. *Radices* longae, crassae vel graciles. *Caudex* erectus, ramosus, ramis 2-3 cm. longis, gracilis, 5 mm. crassus, caulinis vetustis haud obtectus, squamis deltoideis acuminatis carinatis regulariter imbricatis 2 mm. longis 2 mm. latis dense indutus, apice caules floriferos edens. *Caules* pauci, erecti, simplices, graciles, 2.5 cm. longi, .5-.75 mm. crassi, undique dense mammillosi, infra medium nudi vel folia paucissima minutissima ferentes, supra medium foliosi. *Folia* alterna vel subopposita, plana, viridia, 5-7 mm. longa, 2.5 mm. lata, late obovata vel obovato-rhomboida vel obovato-oblonga vel

obovato-lanceolata, apice rotundata, basi cuneata; inferiora integra breviter petiolata, petiolis mammillatis; superiora sessilia marginibus saepe sinuata. *Inflorescentia* 1-3-flora, pedicellis gracillimis purpureis flores aequantibus. *Flos ♂* :—*Sepala* 4, oblonga, obtusa, 1.75 mm. longa, .5 mm. lata, basi purpurea, apice aurea. *Petala* 4, oblongo-linearia, obtusa, 2.5 mm. longa, .6 mm. lata, reflexa, aurea et purpurea. *Stamina* 8, 2.25 mm. longa, epipetala sextante adnata; filamenta purpurea. *Squamae nectariferae* oblongae, emarginatae, .5 mm. longae, .3 mm. latae, reflexae, purpureae. *Carpella* 4, 1.2 mm. longa, vacua.

Yunnan: Lichiang Range, lat. $27^{\circ} 25'$ N. Alt. 12,000 feet. June 1913. Plant of 1-2 inches. Flowers ruddy-green. Open limestone rocks. G. Forrest, No. 10,319.

A very elegant plant, recalling especially in its flowers a tiny *S. roseum*, but differing from the *roseum* group in its well-developed caudex-scales.

S. coreense, Nakai.

"Affine *S. polystichoides* ("polytrichoides"), sed folia sunt latiora et laxa. Caulis simplex v. ramosus 4-15 cm. altus carnosus, inferne squamis rubris ellipticis 2-4 mm. longis obtectus et praecipue circa basin imbricato-obtectus. Folia oblanceolata-linearia v. oblanceolata carnosa viridia sessilia 1-1.5 cm. longa, 2-2.5 mm. lata. Cyma 2-3 cm. lata oligoflora. Flores sessiles flavi pentameri. Sepala angusta 1 mm. longa. Petala 2.5 mm. longa angusta. Corea: Imsil, viii. 1912. (T. Mori, No. 132). In silvis insulae Wangt³ 20.vi.1913. (T. Nakai No. 799)." Fedde Repertorium xiii, 272-3. 1914.

Nakai's description is meagre, especially as regards the flower, and may be amplified from a good series of Corean specimens of Faure's and Taquet's collecting in Herb. Léveillé (named in all cases *S. polytrichoides*, Hemsley).

Plant perennial, tufted. Barren shoots quite short, with leaves crowded at apex. Lower leaves of the flowering shoots small, and with those of the previous season persistent and withering, forming the "squamae rubrae" of the description.

Inflorescence of 2-3 simple or forked 3-4-flowered branches. Sepals deltoid, blunt, 1.5 mm. long, 1 mm. wide at base. Petals elongate, lanceolate-deltoid, rather blunt, 5 mm. long, with a mucro falling short of the tip. Stamens 2.5 mm. long, the epipetalous ones inserted near base. Scales spatulate, emarginate, only .25 mm. long. Carpels 3 mm. long, tapering into the styles.

The main points of difference with Nakai's diagnosis are in the sepals and petals, the latter being twice as long as in his

description; but his too brief notes on the flower probably point to poor material or inadequate observation. With the main points of his description the specimens agree.

Corea : (1) In rupibus montium, Naipiang, Julio 1901. U. Faurie, No. 276. (2) In rupibus littoris Ouen-san, Junio 1906. U. Faurie, No. 633.

Quelpaert : (1) In rupibus Quelpaert, Junio 1907. U. Faurie, No. 1807. (2) In rupibus Hallaisan, 1400 m., 12 Aug. 1908. E. J. Taquet, No. 817. (3) In rupibus Hallaisan, 1500 m., 25 Aug. 1911. E. J. Taquet, No. 5612.

S. crassipes, Wall.

(1) Upper Burma : Imaw Bum. Alt. 13,000 ft. Lat. $26^{\circ} 10'$ N. Long. $98^{\circ} 30'$ E. 27.7.19. Sedum. Flowers palest yellow or cream. Anthers red. On boulder scree among scattered shrub-growth; or amongst dwarf Rhododendrons. F. Kingdon Ward, No. 3426.

(2) Yunnan : Western flank of the Shweli-Salwin divide. Lat. $25^{\circ} 20'$ N. Alt. 11,000 feet. Plant of 6–16 inches. Flowers dull brassy-yellow. In crevices of cliffs and on humus-covered boulders. Aug. 1912. Forrest, No. 9015.

Sedum Cretini, Hamet, (Plate clxxi, 2).

(1) Himalaya : Guicha La, East Himalaya, 16,000 feet. 12.8.13. Coll. Rohmoo Lepcha, No. 1007 (female plants in flower).

(2) Himalaya : Guicha La, 15,000 feet. 1913. Coll. Ribu and Rohmoo, No. 6633 (female plants in immature fruit).

This species was recently (Journ. of Bot. liv (1916) Suppl. pp. 16–18) described by Hamet from plants collected in Sikkim by Smith and Cave in 1909 (Nos. 1206, 1299) at 12,000–16,000 feet. The specimens, which are very fully described, are all male. The species is remarkable among the Rhodiolas for having a slender branched rhizome which emits many slender suckers, which on coming to the surface give rise to a new tuft of flowering shoots. Among described species of Rhodiola this habit is unique, but as figured in a forthcoming paper in Journ. Roy. Hort. Society a plant of *S. crassipes*, Wall. in my garden behaved in an exactly similar manner. Another of similar habit, *S. discolor*, is mentioned in the present paper. Some other species (e.g., *S. himalense*, Don) are capable of sending out slender sucker-like shoots if the rhizome is injured below the ground: these, on reaching the surface, proceed to develop flowering shoots from the axils of their scale-leaves, and the sucker thickens and elongates into a normal aerial caudex. As *S. Cretini* is re-

markable among Rhodiolas, the female plant is figured here, and the female flower described.

Flos ♀ :—*Sepala libera*, linearia, obtusa, .4 mm. longa, .8 mm. lata. *Petala libera*, lineari-oblanceolata, obtusa, 4.5 mm. longa, 1.2 mm. lata. *Stamina nulla*. *Squamae nectariferae quadratae*, emarginatae, .75 mm. longae et latae. *Carpella* 6.5 mm. longa, in stylos capitellatos divergentes angustata.

S. Cretini is closely related to *S. crassipes*, Wall., and two of the more obvious characters by which it is distinguished—its soboles and its dioecious flowers, are not unknown in abnormal forms of that species. But its caudex appears never to become thick and aerial, each crown being short-lived; its flower-stems are much shorter, its leaves shorter and broader, and only the upper ones slightly toothed. Of flower characters it is not possible to speak with certainty, as the floral parts in both species are variable in shape and relative length, and abundant material would be necessary for adequate comparison.

There are two sheets of this species in Kew Herbarium. One, displaying the typical plant (♀) is of J. D. Hooker's collecting, from Lachen, Sikkim, 12,000–14,000 ft., June 20 and July 14, 1849. It is labelled by Hooker "*S. crassipes*, Wall. (plant junior)" and by C. B. Clarke "*S. asiaticum*, DC. Fl. Ind. ii, 419" (which = *crassipes*, Wall., not *asiaticum*, DC.) The other (also ♀) is from "Tongolo, Principauté de Kiala, Thibet Oriental," J. A. Soulié, 1893 (No. 325). While possessing the slender branching rhizomes and unisexual flowers of *S. Cretini*, its stems are taller than in the type (8–16 cm. instead of 3–5 cm.), and its leaves longer and more toothed; in these respects it varies towards its close ally *S. crassipes*. This second plant, and the stoloniferous form of *crassipes* referred to above, suggest that *S. Cretini* might be more correctly placed under *S. crassipes* as a variety.

S. discolor, Franchet. (Plate clxxiii).

Four sheets in the Edinburgh herbarium and one at Kew are best placed here, but Franchet's description must be amplified to receive them. His diagnosis, founded on two gatherings of Delavay (Nos. 3691, 3771) describes the plant as hermaphrodite, many-stemmed, leaves 2–3 mm. broad with a few teeth at the apex, and carpels 4 mm. long. The gatherings which I have seen include both dioecious and hermaphrodite plants characteristically single-stemmed or at most 2–3-stemmed, with leaves 3–5 mm. broad, toothed throughout their length or more rarely entire, and carpels (in the female and hermaphrodite plants) only 1.5–2 mm. long, in fruit 3–4 mm. long. In other features the

plants agree with *discolor* as far as is to be expected in this variable group. As Franchet's description is somewhat short and includes only the hermaphrodite plant, I append the description and figure which I had prepared before it had appeared that the specimens might be placed under *S. discolor*, amplifying from Franchet where required by notes in parenthesis.

Species *S. bhutanico*, Praeger, *S. purpureoviridi*, Praeger, *S. bupleuridei*, Wall. consanguinea. *Sedo bhutanico proxima*, sed caudice gracili repente (nec crasso erecto), foliis minoribus angustioribus brevipetiolatis (nec sessilibus) subtus glaucis (nec viridibus), sepalis floris feminini deltoideis (nec linearibus), squamis floris masculini multo minoribus, carpellis floris masculini multo majoribus, differt. A *S. purpureoviridi* caulibus foliisque glabris (nec pubescentibus), caudice gracili repente, (nec crasso erecto) etc. differt. A *S. bupleuroide* caudice gracili repente (nec crasso erecto), foliis angustioribus brevipetiolatis (nec sessilibus) plerumque dentatis (nec integris) subtus glaucis (nec viridibus) marginibus revolutis (nec planis), etc. differt.

Herba perennis, glabra, caules steriles non edens. *Caudex* gracilis, sinuosus, elongatus, ramosus, hypogaeus, 3-5 mm. diametro, in senectute apice ad 5-8 mm. incrassatus, per longitudinem radices fibratas emittens, apice squamas longe deltoideas (ovato-lanceolatas ex Franchet) acuminatas et caules floriferos ferens. *Caules* solitarii, raro bini vel terni (plures ex Franchet), erecti, simplices, glabri, foliosi, 12-40 cm. longi, 1.5-3 mm. crassi; caules vetusti per 2-3 annos nonnumquam persistentes. *Folia* alterna, internodiis longiora, suberecta, oblongo-lanceolata, raro ovato-lanceolata vel linear-lanceolata vel ovata, (oblongo-linearia ex Franchet), obtuse dentata vel integra, maxima 9-25 mm. longa, 3-5 mm. lata, (2-3 mm. lata ex Franchet), apice acuta vel acuminata, basi auriculata vel rotundata, breviter petiolata, supra viridia, subtus albo-glaucia, marginibus revolutis; petiolus 1 mm. longus; folia infima minora, saepe minutissima. *Inflorescentia* cymoso-paniculata, in planta bene evoluta 3-5 cm. longa, 5-10 cm. lata, laxa, in planta minore 1 cm. longa, 1.5 cm. lata, densa, e ramulis circa 4, 2-3-plo furcatis composita, sparsim foliosa, bracteis foliis similibus sed minoribus. *Flores* 4-meri (saepius 5-meri ex Franchet), dioici vel raro hermaphroditi (hermaphroditi ex Franchet), pedicellis breviores. *Flos masculinus*:—*Sepala* longe deltoidea, obtusa, 1 mm. longa, .5 mm. lata, parte superiore erecta. *Petala* oblongo-lanceolata, obtusa, perconcava, patentia vel deflexa, 3 mm. longa, 1 mm. lata. *Stamina* 8, epipetala brevissime adnata, 1.5 mm. longa; episepala 2 mm. longa. *Squamae nectariferae* oblongae, integrae, .5 mm. longae et latae. *Carpella* erecta, 1 mm. longa. *Flos hermaphroditus*:—*Sepala* oblongo-lanceolata, obtusa, 1 mm. longa, .5 mm.

lata, parte superiore erecta. *Petala* ovato-oblonga, sub-acuta, perconcava, patentia vel deflexa, 2.25 mm. longa (3 mm. longa ex Franchet), 1 mm. lata. *Stamina* 8, 2 mm. longa, epipetala brevissime adnata. *Squamae nectariferae* spathulato-cuneatae, integrae, .5 mm. longae et latae. *Carpella* erecta, 1.25 mm. longa (4 mm. longa ex Franchet), stylis incurvatis. *Flos femininus* :—*Sepala* deltoidea, obtusa, 1–2.5 mm. longa, .6–1.0 mm. lata. *Petala* oblonga, obtusa, 2–4 mm. longa, 1.25 mm. lata. *Stamina* nulla. *Squamae nectariferae* cuneato-oblongae, integrae, .6 mm. longae, .5 mm. latae. *Carpella* 2 mm. longa, crassa, erecta, stylis linearibus divergentibus. *Folliculi* erecti, 3–4 mm. longi.

(1) Yunnan : Eastern flank of the Lichiang Range. Lat. $27^{\circ} 20'$ N. Alt. 9000–10,500 feet. June 1906. Plant of 9–12 inches. Flowers reddish-brown, anthers green. Dry, stony, open situations, ledges of cliffs, etc. G. Forrest, No. 2441. (Male plant. Recorded as "*S. bupleuroides*?" in Notes R. Bot. Gard. Edinb. vii, 131).

(2) Yunnan : Eastern flank of the Lichiang Range. Lat. $27^{\circ} 15'$ N. Alt. 12,000 feet. June 1910. Plant of 4–8 inches. Flowers deep ruddy-green. Open mountain pasture. Forrest, No. 5690. (Female and hermaphrodite plants. Recorded as *S. bupleuroides* in Notes R. Bot. Gard. Edinb. viii, 140).

(3) Sikkim : Changu. Alt. 12,500 feet. 2.7.13. On turf among mossy boulders. R. E. Cooper, No. 128.

(4) Sikkim : Changu. Alt. 12,500 feet. 28.6.13. Amongst mossy boulders old river bed. R. E. Cooper, No. 26.

(The last two not very characteristic—leaves entire and nearly sessile, only slightly glaucous below, and caudex, though horizontal, somewhat thickened).

Wilson's No. 3623 ("Rocks, 12,000 feet. 7/04") in the herbarium at Kew and the British Museum, belongs here—a dwarf plant with unusually broad, ovate leaves (9 × 5 mm.) only slightly glaucous below. Wilson's No. 3623a "10,750 feet. 6.04" at Kew is a taller form with longer leaves of the same breadth as the last.

Undoubtedly this species and *S. purpureoviride* are near the Himalayan *S. bupleuroides*, but that species is especially distinguished by its very broad entire glabrous leaves, which are constant in these characters. In view of the unreliability of floral features in the Rhodiolaee, leaf-characters possess an added importance, and even if the differences of flower between the three prove with further material to be slight, the leaf-characters are well marked; the slender, creeping caudex of *S. discolor* besides separates it from the other two, just as the characteristic

pubescence of leaf and stem in *S. purpureoviride* divides it easily from *S. bupleuroides* and *S. discolor*.

S. dumulosum, Franchet.

Shansi: Wutaishan, Sept. 17-24, 1913. Mary Strong Clemens, No. 9063. (A tall form—stems 9 inches high—with large flowers).

There can be no doubt that *S. rariflorum*, N. E. Brown, which was described from an immature specimen (Herb. Kew) and is now in cultivation at Kew, is referable here. *S. Farreri*, W. W. Sm., also comes so close that it cannot be considered distinct. *S. dumulosum* is evidently a variable species as regards the length of the parts of the flower and the erosion of its petals, but all the specimens examined are easily referable to a well-marked general type characterised by linear leaves, congested inflorescence, linear-deltoid acute sepals, lanceolate or ovate-lanceolate acuminate flagellate erect petals, and short quadrate scales. The variations referred to as noted in the specimens examined may be shown as follows (measurements in mm.).

	Sep.	Pet.	Stam.	Carp.	Erosion of Petals
dumulosum type (ex descr.)	4	8-10 × -	—	6	—
dumulosum (Fr. Hugh, in Herb. B.M., <i>testé</i> Hamet)	5	8 × 2	5	7	Medium
Clemens 9063 (see above)	6	11 × 3	8.5	10	Absent
rariflorum (Kew Gardens)	5	11 × 3	9	7	Slight
Farreri (type spec. Hb. Edinb.).	7-8	11 × 4	7	7	Strong

Another variable feature is in the stems, which are sometimes mammillate near the base, sometimes smooth. The stems vary in height from 3 inches (Hugh) to 9 inches (Clemens), but this probably is due to habitat. *Farreri* is a handsome, stout form, with long sepals and broad strongly eroded petals; but in view of the variability in these respects of the examples of *dumulosum* available, it seems better not to award it varietal rank till we know more about the species.

S. Engleri, Hamet.

(1) Yunnan: Vé gué mo dja près Pintchouan. Plante cueillie par Jean Py. 2.7.1909. F. Ducloux, No. 1612.

(2) Yunnan : On the Tong Shan in the Yangtze Bend. Lat. $27^{\circ} 20'$ N. Oct. 1913. Succulent plant of 6-8 inches. Flowers green. On dry rocks. Forrest, No. 11,439.

This plant was described by Hamet from incomplete specimens, wanting caudex and roots. These are present, though not in their entirety, on the two sheets referred to above, as also in the type specimen of var. *Forresti*, Hamet, described subsequently to the species. They are puzzling and render difficult the placing of the species in any accepted section of the genus. One specimen, apparently a young plant, has a bunch of straight roots, the main one tapered, recalling those of young plants in the sections *Telephium* and *Aizoon*. But mature plants show a sinuous unbranched rootstock some inches in length and $\frac{1}{4}$ inch thick which each year produces a terminal flowering shoot, growth being continued from a lateral point at the base of this, so that the caudex forms a rough zig-zag marked with scars of old shoots about $\frac{1}{2}$ inch apart. This mode of growth is not found in any section of the genus. The leaves of the plant closely resemble those of section *Telephium*, being flat, very broad, entire. The large very unequal sepals recall those of the *Japonica* series and of many Mexican species, and are very far removed from those of *Telephium*. In Forrest 11,489 the leaves are subopposite or subternate, not alternate as in the description. They are also described as oblong, but on both these sheets are broadly obovate, the upper ones alone approaching an oblong form. The absence of a perennial terminal bud producing scales from the axes of which flowering shoots arise keeps the plant out of section *Rhodiola*, which in some respects it recalls. If the above observations are confirmed by more complete material, the plant may have to be placed in a new section.

S. fastigiatum, H.f et T.

Sikkim : Dzalep La. 14,000 ft. 4.7.13. Yellow, among boulders and debris of scree. R. E. Cooper, No. 152.

S. filipes, Hemsl.

Upper Burma : Kang-fang, E. flank of Imaw-Bum Range. Lat. $28^{\circ} 20'$ N., long. $98^{\circ} 30'$ E. Alt. 6000 ft. 25.9.19. Flower pure white, stamens brick red. Growing in beds of moss in a very dark situation beneath a big boulder in the forest. A charming little plant with the leaves almost membranous. F. Kingdon Ward, No. 3690.

Well-preserved specimens in the Edinburgh herbarium, collected by E. H. Wilson in Hupeh in 1901 and 1907, and others

at Kew, show that the flowers are sometimes purple (of a lilac shade *in siccо*)—apparently more often purple than white.

S. formosanum, N. E. Br.

- (1) Kwang-tung : Swatow, 180 miles N.E. of Hong Kong.
25.4.00. J. M. Dalziel.
(2) Fo-kien : Foochow, May 1897. W. R. Carles, No. 597.

Sedum horridum, Praeger, sp. nov. (Plate clxxiv, 1).

Rhodiola *S. nobili*, Franch. et *S. Smithi*, Hamet, ex descript. affinis. Ab *S. nobili* caulibus pedicellisque foliisque scabridis (nec glabris), inflorescentia 4–8-flora (nec uniflora), caulibus vetustis inferioribus erectis (nec patulis), petalis 3 mm. (nec 6 mm.) longis etc. differt. Ab *S. Smithi* caulibus etc. scabridis (nec glabris) robustis (nec gracilibus), sepalis petalique angustioribus, etc. distinguuntur.

Herba perennis scabrida, caules steriles non edens. *Caudex* erectus, crassus, simplex, nisi basi caulis emarcidis vetustis imbricatis squamisque longe deltoideis 5 mm. longis dense obtectus, apice caules floriferos ex squamarum longe deltoidearum axillis ferens. *Caules* multi, erecti, simplices, dense foliosi, scabridi, circiter 4 cm. longi. *Folia* oblongo-lanceolata ad oblongo-ovata, obtusa, sessilia, crassa, supra subtusque papillosa, 6–9 mm. longa, 2–2.5 mm. lata. *Inflorescentia* densa, 4–8-flora, bracteata; bractae foliis similes sed minores; pedicelli .5 mm. longi. *Flores* 4-meri, dioici, 4 mm. longi. *Flos ♂* : *Sepala* oblongo-ovata vel oblongo-lanceolata, semiteretia, obtusa, 2.5–3 mm. longa, .75–1.0 mm. lata. *Petala* erecta, ovata vel ovato-rhomboidea, obtusa, 3 mm. longa, 1.75 mm. lata, parte connata .5 mm. longa. *Stamina* 8, 3.25 mm. longa, epipetala fere ad basim inserta, filamenta longissime deltoidea. *Squamae nectariferae* subquadratae, apice retusae, .3 mm. longae, .5 mm. latae. *Carpella* abortiva, .75 mm. longa.

W. Yunnan : Mossy, stony, shady situations in pine forests on the eastern flank of the Tali Range. Lat. $25^{\circ} 40'$ N. Alt. 12,000–13,000 ft. Oct. 1906. Erect plant of 3–9 inches. Flowers green, anthers brown. G. Forrest, No. 5055. (Published as *S. nobile*, Franch., *vel aff.* in Notes R.B.G. Edinb. vii, 293).

From the few other Rhodiolas characterised by general scabridity it is easily distinguished. *S. scabridum*, Franch. has acuminate mucronate (not blunt) leaves, acuminate (not blunt) sepals, lanceolate acute (not ovate blunt) petals and a much shorter slender caudex. *S. Bouvieri*, Hamet has ovate acute (not linear-lanceolate blunt) leaves, erose (not entire) petals, etc. *S.*

himalese, Don and *S. purpureoviride*, Praeger are tall stemmed plants, not at all near to the present species, and *S. Durisi* is likewise far removed, having a short caudex and a basal rosette of leaves.

***S. humile*, H.f. et T.**

E. Himalaya : Chakalung La, 16,000 ft. 12.9.12. Sedum sp. Coll. Rohmoo Lepcha, No. 314.

***S. indicum*, Hamet.**

The type is a common plant in Yunnan and E. Tibet.

var. *densiroslatum*, Praeger.

(1) Yunnan : Sedum vivace, feuilles de la base imbriquées. Fl. rouges. Toitures, vieux murs, plaine de Tong-tch'ouan. Alt. 2500 m. Novembre. E. E. Maire, No. 232/1914.

(2) Yunnan : Dry situations amongst rocks on the divide between the Hoching and Lichiang Valleys. Lat. $26^{\circ} 40'$ N. Alt. 8000 feet. Nov. 1910. Plant of 3-6 inches. Flowers greenish-purple. In seed. G. Forrest, No. 7351.

(3) Yunnan : Lichiang Range. Lat. $27^{\circ} 30'$ N. Alt. 10,000 feet. Sept. 1918. Succulent plant of 1-3 inches. All parts dull dark crimson. On rocks and stony dry pasture. G. Forrest, No. 17,099.

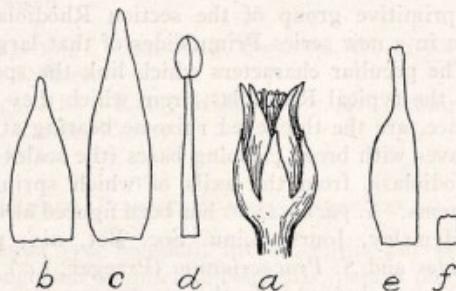
var. *luteorubrum*, Praeger, var. nov. (text figure).

Flores quam in typo majores, sepalis deltoideo-lanceolatis acuminatis 4 mm. longis, 1.5 mm. latis, petalis lanceolatis acuminatis 5-5.5 mm. longis, 1.5 mm. latis, staminibus 5, 4.5 mm. longis, squanis nectariferis quadratis emarginatis .75 mm. longis, .6 mm. latis, carpellis cum stylis longis linearibus 3-4.5 mm. longis.

Yunnan : Mekong-Salwin divide. Lat. $28^{\circ} 10'$ N. Alt. 11,000 feet. Plant of 4-7 inches. Stems and calices red. Corolla pale yellow tipped red. Anthers yellow. Open dry situations amongst rocks and boulders. Aug. 1914. G. Forrest, No. 13,377.

It is with some hesitation that this plant is set down as a variety of *S. indicum*, and not as a species, and if leaves were present they might show that the plant is quite distinct. But the presence of only 5 stamens, and the peculiar shape of the stamens and carpels are characteristic of *indicum*, the sepals and petals of which are variable in shape and relative length. The characteristic thickening on the face of the petal of *indicum* unfortunately

cannot be detected in the dried plant. The stems, pedicels, back and edges of the sepals, and tips of the petals are finely and shortly papillose, a character which I have only once seen (Herb. Edinb.) on *S. indicum*, which is typically glabrous; it is quite different from the hairiness of var. *yunnanense*. The erect stem is unbranched save quite at the top, giving the inflorescence (which is about $1\frac{1}{2}$ inch long and 2 inches broad) an umbellate appearance (different from normal *indicum*). A few of the uppermost bracts remaining resemble the sepals, and are sessile, lanceolate and acuminate (those of *indicum* are usually stalked and oblanceolate or oblong). The flowers are yellow, much flushed with red, and are 6 mm. long—much longer than in typical *indicum*, but there is one plant in Herb. Edinb. with flowers as large. The long, straight, erect petals make the outline of the flower oblong, different from the sub-orbicular shape given by the incurved petals of *indicum*. The stem shows scars of 20 to 30 leaves, the scars being crowded at the base as in *indicum*, but showing none of the thickening usually seen in *indicum* as the result of its first year rosette stage.



Sedum indicum, Hamet, var. *luteorubrum*, Praeger. a, flower $\times 3$; b, sepal, c, petal, d, stamen, e, carpel, f, scale, all $\times 6$.

var. *yunnanense*, Hamet.

Yunnan : Sedum vivace, feuilles de la base imbriquées. Fl. rouges. Toitures, vieux murs, plaine de Tong-tch'ouan. Alt. 2500 m. Novembre. E. E. Maire, No. 232/1914.

S. Kirilowii, Regel.

(1) Himalaya : Ridge above Changu, Sikkim. Alt. 13,000 feet. 28.6.13. In peat and moss-grown boulders. R. E. Cooper, No. 53.

(2) S.E. Tibet : Forest, 14,000 feet. Ka-gwr-pw. July 21, 1913. F. Kingdon Ward, No. 848.

An additional station from the Kew Herbarium may be added :—

- (3) Himalaya : Chongra, one day N.W. of Chumbi. 7 July 1878. Coll. Dungboo. Flowers white or red.

S. Leblancae, Hamet.

(1) Yunnan : Sedum annuel. Fl. jaunes. Rochers des collines à Tong-tch'ouan, alt. 2550 m. Novembre. E. E. Maire. Nos. 228/1914, 231/1914.

(2) W. Szechuan—10.08. E. H. Wilson, No. 2499. (A sheet of the same gathering is in the Kew Herbarium¹.

S. Leveilleanum, Hamet. (Plate clxxii, 1).

In describing this remarkable Sedum (Bull. Soc. Bot. France, lv (1908), 712), which comes from the Island of Quelpaert (Faurie Nos. 136, 623, 1795, 1500–1700 mètres) M. Hamet linked it with *S. primuloides*, Franch. from Yunnan and *S. pachyclados*, Aitch. and Hemsl. from Tibet. I have endeavoured to show (Trans. Bot. Soc. Edinb. xxvii (1917), 107), that these three species belong to a primitive group of the section Rhodiola, and have placed them in a new series Primuloïdes of that large section of Sedum. The peculiar characters which link the species of this group with the typical Rhodiolas, from which they differ much in appearance, are the thickened rhizome bearing at its summit a tuft of leaves with broad clasping bases (the scales of the more typical Rhodiolas), from the axils of which spring the leafy flowering-stems. *S. pachyclados* has been figured already (Aitchison and Hemsley, Journ. Linn. Soc. Bot. xix, pl. 10) also *S. primuloides* and *S. Praegerianum* (Praeger, l.c.) and *S. Balfouri* (*supra* v, pl. lxxxv). In the present paper a new member of the group, *S. Barnesianum*, is figured. I am glad to be able to add a figure of *S. Leveilleanum*. Two good sheets of the plant are in the British Museum (Faurie Nos. 623 and 1795), labelled in Hamet's writing, by a strange inadvertence, *S. sikokianum*, Hamet (*sic!*); the figure is taken from a specimen on the latter sheet, by kind permission of Dr Rendle.

Writing to me in 1919, M. Hamet put forward a different view as to the affinities of *S. Leveilleanum*. "Le *S. Leveilleanum*," he says, "contrairement à mon opinion primitive, ne peut être rapproché des *S. primuloides* et *pachyclados*. Il trouve sa place au voisinage du *S. spinosum*." It is difficult to find grounds for this opinion. Pending publication of the reasons for it, discussion is premature, but the case for M. Hamet's original opinion, in which I fully concur, is undoubtedly strengthened by the discovery of the allied *S. Barnesianum*, described on a preceding page.

M. Hamet's description is full, and little can be added to it. It is important to note that the caudex-leaves have the broad clasping base characteristic of *Rhodiola*, a critical point, to my mind of high diagnostic value, not previously mentioned. The leaves when dry are white at the tip, recalling those of *S. limuloides*, Praeger and *S. spinosum*, Thunberg. The petals are erect, concave, minutely beaded on the mid-rib, hooded at the apex, with a minute mucro behind and exceeding the tip. From the trace of colour remaining, they appear to be reddish. The carpels and scales in the specimen examined are considerably smaller than described by Hamet (carpels 1.5 mm. long instead of 2.75, scales .5 mm. long instead of .75), and as I suspect that they are abnormal I have not figured them.

In comparing the figure with that of *S. primuloides* (*I.c.*) it should be borne in mind that the latter is from a garden-grown plant. Collected specimens of *S. primuloides* are as dwarf and congested as in the figure of *S. Leveilleanum*, rendering the two very similar in appearance.

***S. lineare*, Thunb.**

- (1) Kwang-tung : Thai-yong, 60 miles W. of Swatow, July 1901. J. M. Dalziel.
- (2) Kiangsi : Kew-Kiang Hills. 22.5.92. Sedum sp. Yellow. W. R. Carles, No. 175.

***Sedum longistylum*, Praeger, sp. nov. (Plate clxxv, 2).**

Species annua (vel biennis), inflorescentiis parvis ad apices ramorum longorum simplicium congestis, petalis oblongo-ovatis acuminatis purpureis, staminibus quinque, carpellis stylis longis coronatis distinguenda.

Herba annua (vel biennis), glabra, 20–25 cm. alta. *Caulis* erectus, ramosus, ramis longis (ad 20 cm.) divergentibus simplicibus floriferis. *Folia alterna*. *Inflorescentia* congesta, pseudo-umbellata, 1.0 cm. longa, 1.5 cm. lata, pedicellis quam flores brevioribus, bracteis paucis integris planis ovatis sessilibus breviter acuminatis 2–3 mm. longis. *Flores* 10–20 (in quaque inflorescentia) purpurascentes. *Calyx* 3.5 mm. longus; pars concreta 1.25 mm. longa; pars libera segmentis inaequalibus 5 oblongo-deltoides obtusis viridibus 1.5–2.5 mm. longis, 1–1.25 mm. basi latis. *Petala* 5, oblongo-deltoida acuta vel oblongo-ovata acuminata, 3.5–4.0 mm. longa, basi 1.25 mm. lata, parte superiore purpurea. *Stamina* 5, episepala, 3 mm. longa, filamentis longissime deltoideis, antheris aureis. *Squamae nectariiferae* minutae, emarginatae, paullo latiores quam longiores, .75

mm. latae. *Carpella* 5, erecta, 3 mm. longa, stylis gracilibus erectis 1.25 mm. longis.

W. China : Fl. dark chocolate. Rocks, 4000 ft. 7.03. E. H. Wilson, No. 3640.

The only specimen, which is in the Kew Herbarium, is poor, all leaves having been lost, and the roots are wanting, but its habit and small dense inflorescences of purple flowers, possessing only 5 stamens, distinguish it from any other described Sedum. To judge from the few bracts, the leaves are broad and entire.

Sedum macrocarpum, Praeger, sp. nov. (Plate clxxvi).

Sedo Kirilowii, Regel, propinquum, sed carpellis floris feminini insignibus, caule et inflorescentia papillosis (nec glabris), foliis plerumque subverticillatis (nec alternis) differt.

Planta perennis. Caudex crassus, apice squamas longe deltoideas acutas circiter 4 mm. longas et caules floriferos ferens. *Caules* pauci, annui, erecti, simplices, foliosi, 10–30 cm. longi, in parte superiore minute papillosi. *Folia* subverticillata vel alterna, plana, sessilia, glabra, acuta; infima minima lanceolata integra; superiora linearis-lanceolata, acute et irregulariter dentata, 2–4 cm. longa, ad 1 cm. lata. *Inflorescentia* cymosa, satis laxa, 2–4 cm. longa, 3–7 cm. lata, bracteata; bractae inferiores foliis similes et aequilongae, inflorescentiam multo superantes; bractae superiores minores, marginibus in parte superiore dentatis in parte inferiore papillosis; inflorescentiae rami papilloso-pedicelli papillosi, floribus plerumque breviores. *Flores* 5-meri, dioici. *Flos* ♀ : *sepala* et *petala* linearia, obtusa, flava; *sepala* 5 mm. longa, *petala* 6 mm. longa; *squamae nectariferae* quadratae, emarginatae, 1 mm. longae et latae, purpureae; *carpella* ampla robusta, cum stylis 10 mm. longa, purpurascens; stylis breves, recti, divergentes, stigmatibus capitellatis. *Flos* ♂ : *sepala* et *petala* linearia, obtusa, suberecta, flava vel rubescens; *sepala* 4–4.5 mm. longa, *petala* 5–5.5 mm. longa; *stamina* 10, erecta, 8 mm. longa, flava; *squamae nectariferae* quadratae, 1 mm. longae et latae, carnea; *carpella* linearis-lanceolata, 5 mm. longa, vacua.

(1) Upper Burma : Chimili. Alt. 12,000 feet. Aug. 1, 1919. Sedum sp. Common in stony places and stone slides of the high-alpine region. R. Farrer, No. 1168. (♂)

(2) Upper Burma : Imaw Bum. Alt. 12,000 feet. Lat. 26° 10' N. Long. 98° 30' E. 27.7.19. Sedum. Flowers very pale yellow, almost colourless, fruits bright red. Forms small clumps, or single plants, on sheltered boulder screes, surrounded by bamboos, etc. Protected east slope. F. Kingdon Ward, No. 3412 (♀ and ♂).

An additional station from the Kew Herbarium may be added:—

(3) West Szechuan, 6.08. E. H. Wilson, No. 2527. (These specimens are less extreme, and approach *S. Kirilowii* in their alternate leaves, diminished papillosity and less exuberant bracts).

***S. mekongense*, Praeger, sp. nov. (Plate clxxvii, 1).**

Planta habitu *S. Alfredi*, Hance. *S. Pampaninii*, Hamet pro-pinquā, sed caulibus multo longioribus (ad 20 cm. nec 4–5.5 cm.) basi et medio (nec basi solum) ramosis, foliis majoribus 8–9 mm. (nec 3.8–6 mm.) longis 1.5–2 mm. (nec .6–1.0 mm.) latis, petalis brevioribus 4.5 mm. (nec 6–9.5 mm.) longis, staminibus brevioribus 2.5 mm. (nec 5–6.5 mm.) longis, carpellis brevioribus 2.5 mm. (nec 5.5 mm.) longis distinguenda.

Herba glabra, perennis. *Radices* fibratae. *Caudex* nullus. *Caules* multi, ramosi, ad 20 cm. longi, parte inferiore subrepentes et radicantes, parte superiore ascendentes, foliosi. *Folia* alterna, oblongo-linearia vel linearis-lanceolata vel ovato-lanceolata, plana (?), sessilia, 8–9 mm. longa, 1.5–2 mm. lata, apice acuta, mucronata, basi calcarata; calcar integrum, obtusum. *Inflorescentia* terminalis, 3–8-flora, 1–2 cm. lata, e flore terminali et ramis duobus patentibus 2–3-floris plerumque composita; bracteae foliis similes sed minores. *Flores* sessiles vel subsessiles, lutei, 5-meri. *Sepala* libera, inaequalia, longe deltae vel oblonga, obtusa vel apiculata, 3–4.5 mm. longa. *Petala* libera, lanceolata, obtusa vel subacuta, 4.5 mm. longa, 1.5 mm. lata, nervo in mucronem apicem superantem producto; mucro .5 mm. longus. *Stamina* 10, epipetala basi inserta, filamentis filiformibus 2–2.5 mm. longis, antheris ovatis .5 mm. longis. *Squamae nectariferae* minutae, quadratae, retusae, .4 mm. longae et latae. *Carpella* cum stylis 2.5 mm. longa; styli longi recti graciles, 1 mm. longi.

Yunnan : Mekong Valley. Lat. 28° 20' N. Alt. 6000 feet. June 1917. Plant of 6–10 inches. Flowers yellow. On dry rocks. G. Forrest, No. 14,537.

It is with some regret that one adds another to the many species of the Japonica group which have narrow pointed leaves, but the present plant appears quite distinct from any of those previously described. It produces a grove of annual ascending stems from a decumbent base, after the manner of *S. Alfredi* or the American *S. mexicanum*. The material is poor, all the leaves having dropped off, but a figure of a shoot is given restored as far as possible.

S. Oreades, Hamet.

(1) Yunnan : Tali Range. Lat. $25^{\circ} 40'$ N. Alt. 12,000 feet. Aug. 1913. Plant of 2 inches. Flowers bright golden-yellow. On ledges of cliffs and humus-covered boulders. G. Forrest, No. 11,706.

(2) Yunnan : Mountains east of Chungtien. Lat. $27^{\circ} 50'$ N. Alt. 14,000 feet. Plant of 2-5 inches. Flowers brassy-yellow. Open, moist, stony pasture and on rocks and boulders. Aug. 1917. G. Forrest, No. 15,118.

(3) S.E. Tibet : On Ka-gwr-pw, Mekong-Salwin divide. Lat. $28^{\circ} 30'$ N. Alt. 13,000 feet. Aug. 1917. Plant of 2-4 inches. Flowers golden yellow. On open cliffs and boulders. G. Forrest, No. 14,620.

This is *Cotyledon Oreades*, C. B. Clarke, (*Umbilicus Oreades*, Decne.) so placed on account of its 5 stamens and connate petals, which are conjoined for a length of 3 mm. As a matter of fact the number of the stamens is quite irregular. In Nos. F. 14,620 and F. 15,118 there are 10, all fully developed, the epipetalous ones 5 mm. long (1 mm. shorter than the others), and adnate for half their length. In F. 11,706 and Wilson 1191 the 5 epipetalous stamens are shrunken and abortive. In other gatherings (F. 6511, F. 7212) we get, for instance, 1 or 2 abortive epipetalous stamens, or 6 petals, 3 of them with abortive stamens. In none are epipetalous stamens wholly absent.

The two first-mentioned plants, with 10 functioning stamens, belong to a large race with up to 20 flower stems 4 to 5 inches high, and inflorescences with up to 7 (not 1-3) golden (not white) flowers.

The 10-stamened form is excellently figured by Decaisne in Jacquemont's "Voyage," Atlas, ii, pl. 73, fig. 2, as *Umbilicus luteus*, a name altered in the letterpress of the same work (iv, 62) to *U. Oreades*; there the stamens are stated to be five and the flowers yellow.

S. orichalcum, W.W. Sm. (Plate clxxvii, 2).

I am glad to have an opportunity of figuring this very interesting species, and of correcting an error regarding its leaves. The leaves of the rosette were described* as "basi rotundata," and in discussing the plant I referred to them as "narrowed at the base and joined to the caudex in the usual Sedum manner by a very constricted attachment."† A fuller examination of the type shows that this statement was founded on an imperfect leaf. The root-leaves are joined to the caudex by a broad clasp-

* Notes R. Bot. Gard. Edinb. ix, 125.

† Proc. R. Irish Acad. xxxv B, 4, 1919.

ing base exactly as in the Primuloides group of *Rhodiola*, to which the plant also conforms in its axillary flower-stems. It appears to be close to *S. Balfouri*, with which it agrees in its *Sempervivum*-like leaf rosette, cymose inflorescence with arcuate branches and linear nectariferous glands (the last feature very unusual save in the *Telephium* section); I think it should be placed next to that species (of which a figure will be found in Notes R. Bot. Gard. Edinb. v, pl. lxxxv).

S. Praegerianum, W.W. Sm.

Tibet : Chumbi, 28.8.13. R. E. Cooper, No. 711. (The Chumbi Valley is the locality where the species was originally obtained by a native collector).

S. primuloides, Franchet.

Yunnan : Oct. 1913. G. Forrest, No. 11,451.

S. pseudospectabile, Praeger.

Corea : (1) Chemulpo, in petrosis collium. Sept. 1906. U. Faurie, No. 624. (2) Chinnampo. Sept. 1901. U. Faurie, No. 282.

Sedum pseudostapfii, Praeger, sp. nov. (Plate clxxiv, 2).

Sedo Stapfii, Hamet subsimilis, sed statura duplo majore, verticelli foliis biformibus latioribus, pedicellis 1-3 (nec 5-10) mm. longis, inflorescentia bracteata (nec nuda), petalis oblong-lanceolatis (nec obovatis vel suborbicularibus) integris (nec marginibus erosionis) differt.

Planta perennis, glabra. Radices fibratae. Caudex gracilis, repens (?), apice caulem sterilem brevem vel caulem floriferum emittens. Caulis sterilis brevissimus, gracilis, sparsim foliosus; caulis floriferus erectus, simplex, 4-5 cm. longus, infra nudus, supra medium foliorum verticellum, apice inflorescentiam, ferens. Folia rami sterilis 2- aut 4-verticillata biformia, alia majora, alia minora; folia majora petiolata; petiolus ad 5 mm. longus; lamina plana, integra, late obovata vel ovato-rhomboidea, 2 cm. longa, 1.5 cm. lata, apice abrupte apiculata, basi cuneata; folia minora plana, integra, spatulata, apice obtusa, circa 5-8 mm. longa. Folia rami floriferi 4-verticellata, in verticellum unicum disposita, duo majora, alterna minora; folia majora plana, integra, petiolata; petiolus 3-5 mm. longus; lamina late obovata vel ovato-rhomboidea apice abrupte apiculata, 2.0 cm. longa, 1.5 cm. lata; folia minora breviter petiolata, apice obtusa; lamina 1.0 cm. longa, .7 cm. lata. In-

florescentia cymoso-paniculata, circiter 15 mm. longa et lata, e ramis 4-5 composita; rami bracteati; bractae obovatae, obtusae, sessiles, circiter 4 mm. longae, 3 mm. latae. *Flores* 5-meri, albi, minuti, pedicellis brevissimis. *Calyx* 2 mm. longus, rubro-punctatus, segmentis ovato-oblongis obtusissimis 1.5 mm. longis basi 1.0 mm. latis. *Petala* late oblongo-lanceolata, obtusa, 2-2.5 mm. longa, .75 mm. lata, apice cucullata. *Stamina* 10, 1.75-? mm. longa, epipetala parum adnata, filamentis linearibus, antheris reniformibus. *Gynoecium* late ovatum, carpellis 2 mm. longis erectis, stylis brevibus erectis. *Squamae nectariferae* minutissimae.

Sikkim: Lachen and Cheungtong. Alt. 8000 feet. 9.8.13. "Succulent small white, among moss, etc." R. E. Cooper, No. 440.

A very peculiar little plant, of which further material would be desirable; it is difficult to point to any species to which it has affinities. To judge from the number of leaf-scars the short barren shoot lasts for more than one year before lengthening into a flowering shoot with its single verticel of unequal leaves. It comes nearest to *S. Staphii*, Hamet, which is figured from the type for comparison (Plate clxxiv, 3).

S. purpureoviride, Praeger.

This species is well represented in the Edinburgh Herbarium.

(1) S.E. Tibet: On the Ka-gwr-pw, Mekong-Salwin divide. Lat. 28° 25' N. Alt. 13,000 feet. Aug. 1917. Plant of 2 feet. Flowers yellow. Open stony pasture and on ledges of cliffs. Forrest, No. 14,512. (This plant is less pilose than is usual).

(2) Yunnan: Forrest, No. 2610 (*supra* vii, p. 146, where Diels records it as *S. roseum*, Scop., var. (?)).

(3), (4) Forrest, Nos. 6065, 6135 (*supra* viii, p. 141, where Hamet records them as *S. roseum*, Scop., var.).

(5) Tsekou, July. Monbeig. 83/112.

(6), (7), (8) Monbeig, No. 115; Monbeig (no number); Ward, No. 744. (For particulars see Journ. of Bot., lv (1917), p. 40).

Note:—A plant at Kew and the British Museum collected by A. E. Pratt in West Szechuan (No. 547) is a vigorous form of this species with leaves much broader and more oblong than in type and (especially the British Museum specimens) resembling *S. Fabaria* in shape and dentition of leaves.

S. Rendlei, Hamet.

Described ("Kew Bulletin," 1913, 157) as having caudex creeping, suberect at the apex; stems glabrous, petals very broadly linear. The type is at the British Museum, and a co-type at Kew. In these the pedicels and upper part of the stem

are papillose, and the petals would be better described as ovate-lanceolate. As regards the caudex, while in the British Museum specimens this appears to have been creeping, in the Kew plants it was clearly erect.

Sedum robustum, Praeger, sp. nov. (Plate clxxviii).

Species *S. roseo*, Scopoli et affinibus consanguinea, sed foliis linearibus integris *S. algido*, Ledeb. similius, a *S. roseo* aliquo distans. A *S. algido* caulibus robustis et foliis majoribus differt. A *S. roseo* et affinibus, quoque *S. algido*, sepalis quam petala longioribus, staminibus brevissimis, etc. valde differt.

Herba dioica, perennis, robusta, glabra. Caudex erectus, elongatus, crassus, 2–2.5 cm. diametro, infra nudus vel caulis vetustis paucis paleaceis praeditus, apice squamas ovatas vel lanceolatas erectas acutas brunneas et caules floriferos emittens. Caules pauci, erecti, robusti, glabri, simplices, 15–20 cm. alti, 5–8 cm. diametro, foliosissimi a basi ad apicem. Folia integra, plana, late linearia, apice obtusa, apice et basi angustata, 30 mm. longa, 4 mm. lata. Inflorescentia terminalis, densa, 3 cm. diametro, foliosissima. Flores 5-meri, campanulati. Flos ♂: Sepala linearia obtusa, 4 mm. longa, .5 mm. lata, purpurea vel apice purpurea. Petala oblongo-lanceolata, obtusa, libera, 3 mm. longa, 1 mm. lata. Stamina 10, epipetala prope ad basim inserta, 2 mm. longa; episepala 2.5 mm. longa. Squamae nectariferae minutae, ovatae. Carpella minutissima, 1 mm. longa.

(1) S.E. Tibet : Moist, open pasture on the Mekong-Salwin divide, Mekong Valley. Lat. 28° N. Alt. 12,000 feet. Sept. 1904. Plant of 6–12 inches. Flowers green. G. Forrest, No. 5088.

(2) N.W. Yunnan : Moist, rocky pasture on the Kari Pass, Yangtze-Mekong divide. Lat. 28° N. Alt. 12,000–14,000 feet. Sept. 1904. Plant of 6–10 inches. Flowers green. G. Forrest, No. 5087.

These two plants are recorded as “*S. roseum*, Scop. vel aff.”, *supra*, vii, p. 297.

A third locality may be added from the Kew Herbarium :—

Yunnan : Tsekou. Coll. by Père T. Monbeig.

The weak development of the caudex-scales points to affinities with the *roseum* group of *Rhodiola*. The plant is apparently not so variable as many of the *Rhodiolas*, the three gatherings being very closely similar. It appears to be of much softer texture than most of its allies, the stems becoming quite thin and flat in drying, not twig-like, and the leaves being obviously limp.

The exceedingly short stamens are found in all three gatherings, and are apparently normal, but the filaments have not altogether the appearance of being properly developed, and are

possibly dwarfed. I have seen similar stunted stamens in flowers of *S. proponticum* and *S. Someni*, due in the first case to weakness caused by attacks of green-fly, and in the second to immaturity of the plant. Such short stamens are very exceptional in *Rhodiola*.

***S. roseum*, Scop. var. *atropurpureum*, Turcz.**

- (1) N.W. Yunnan : On rocks, 13,000 ft. A-tun-tsü, 27.6.13. F. Kingdon Ward, No. 564 (in part). A beautiful little plant, with very glaucous leaves and dark purple flowers.
- (2) Yunnan : Rocks, etc., 14,500 ft. A-tun-tsü, 7.8.13. F. Kingdon Ward, No. 985.

***S. rotundatum*, Hemsley.**

- (1) E. Himalaya : Kalaeree, 16,000 ft. 12.9.12. *Sedum* sp. Col. Rohmoo Lepcha, No. 435.

(2) S.E. Tibet : Sarong. Alt. 12,000 ft. On Doker-la, Mekong-Salwin divide. Lat. $28^{\circ} 20'$ N. Bunched plant of 3-5 inches. Flowers bright red-crimson. Open ledges of cliffs and humus-covered boulders. Aug. 1917. G. Forrest, No. 14,707.

(3) E. Tibet : Doker-la. *Sedum*. Forming big cushions among boulders, 16,000 ft. 13.7.13. F. Kingdon Ward, No. 764.

(4) N.W. Yunnan : A-tun-tsü. July. Fleshy leaves. Scree of boulders. 1911. F. Kingdon Ward, No. 36.

(5) N.W. Yunnan : Mountains of the Chungtien Plateau. Lat. $27^{\circ} 30'$ N. Alt. 13,000 ft. July 1914. Succulent plant of 6-8 inches. Flowers crimson. Open ledges of cliffs and on stony pasture. G. Forrest, No. 12,833.

Two additional stations for this striking plant may be added from the Kew Herbarium :—

(6) W. China : Fl. yellow. Bare rocks and stony places. Alt. 12,000-14,000 ft. 9.04. E. H. Wilson, No. 3628.

(7) Sikkim : Thanka-la. Alt. 16,000 ft. 25 Nov. 1911. (As *Sedum crenulatum*). Coll. Ribu and Rohmoo, No. 5803.

***S. scabridum*, Franchet.**

(1) Himalaya : Above Dakwani, about 12,000 ft. 8.9.85. Presented by J. R. Reid (as *S. asiaticum*, DC.)

(2) Himalaya : Height above Chahlek, Byans, about 12,000 ft. July 23, 1886. Presented by J. R. Reid (as *S. asiaticum*, DC.)

S. Someni, Hamet.

(1) Yunnan: Sedum annuel. Fl. jaunes. Toitures et roches au pied des mont à Tong-tch'ouan, alt. 2500 m. Octobre. E. E. Maire, No. 609/1913.

(2). Yunnan: Sedum annuel. Feuilles en rosette. Fl. jaunes en ombelle. Toitures, vieux murs, rochers. Plaine de Tong-tch'ouan, alt. 2500 m. Octobre E. E. Maire, No. 437/1914.

(3) Yunnan: Sedum annuel. Fl. verdâtres. Toitures de Tong-tch'ouan, alt. 2500 m. Novembre. E. E. Maire.

The plant would appear to be biennial, possibly sometimes annual.

Sedum trientaloides, Praeger, sp. nov. (Plate clxxv, 1).

Species insignis, fragilis, gracilis, perennis, foliis latis integris petiolatis inferioribus oppositis mediis 4-verticillatis superioribus minutissimis, inflorescentia laxa pauciflora, floribus albis, pedicellis longis filiformibus distinguenda.

Herba perennis, glabra, fragilis. *Radices* fibratae, graciles. elongatae. *Rami* steriles nulli? *Rami floriferi* annui, erecti vel adscendentes, gracillimi, simplices vel prope basim ramosi, 4-8 cm. alti, foliosi, internodiis irregularibus, .5-3 cm. longis, saepissime circa 2 cm. longis. *Folia* plana, integra, rubro-punctata, ad medium vel supra medium caulis 4-verticellata; verticelli folia duo opposita majora, duo opposita minora; folia majora verticelli petiolata vel subpetiolata; petiolus linearis vel cuneatus 2-5 mm. longus; lamina obovata vel orbicularis, vel rhomboideo-orbicularis, apice rotundata vel obtusissima; basi cuneata, 6-12 mm. longa, 6-12 mm. lata; folia minora verticelli petiolata vel subpetiolata; petiolus 2-3 mm. longus; lamina obovata vel spatulata, apice rotundata, 4-8 mm. longa, 3-5 mm. lata. *Folia* infraverticillaria majoribus verticelli consimilia sed minora, 2 vel 4 vel 6, opposita. *Folia* supraverticillaria 2-4, minuta, opposita vel alterna, sessilia, ovata vel obovata vel oblonga, obtusa, 2-4 mm. longa, sursum in bracteas minutas decrescentia. *Inflorescentia* 1-6-flora, paniculata, laxa, bracteis minutis oblongis vel linearibus sessilibus, pedicellis filiformibus 4-5 mm. longis. *Flores* hermaphroditi, 5-meri, albi, rubropunctati. *Calycis segmenta* oblonga, obtusa, brevissime connata, 1.5 mm. longa, .6 mm. lata, viridia, rubropunctata. *Petala* ovata, apice attenuata, acuta, 3.5 mm. longa, 1.5 mm. lata, alba, rubropunctata, mucronem minutum post apicem ferentia. *Stamina* 10; epipetalorum pars libera 1.5-2 mm. longa, pars concreta 1 mm. longa; antherae aureae. *Squamae nectariferae* cuneatae, ob-

longae, .5 mm. longae, .25 mm. latae. *Carpella erecta*, in stylos breves attenuata, 3 mm longa, rubrolineata.

Upper Burma : Hpimaw Limestone Peak, on wet moss-covered boulders in shade, 9000-10,000 ft. Flowers whitish-pink. 9.7.14. F. Kingdon Ward, No. 1770.

A very distinct little plant of tenuous texture when dried. Although several other Asiatic species agree with it in its peculiar character of a marked verticel of leaves about midway on the stem, with or without other leaves above or below (e.g. *S. Staphii*, Hamet, *S. pseudostaphii*, Praeger (*supra* p. 91), *S. Levii*, Hamet, *S. Bonnafousi*, Hamet) none of these have any affinity with it, and it is difficult to suggest to what species or group of species it is most nearly related. The broad entire opposite stalked leaves, long filiform pedicels, and small white flowers suggest the section *Cepaea*, but the perennial duration and especially the very few-flowered inflorescences will not fit that group. Barren stems are apparently absent, annual flowering stems arising from the lowest leaf-axils of the previous year's stems, as in *S. Alfredi* and some of the Mexican species. All its characters of root, leaf and stem point to its being a plant of damp shady places, as is borne out by the label. Named from its recalling in appearance *Trientalis europaea*, Linn.

S. trifidum, Wallich.

(1) N.W. Yunnan : Pei-ma-Shan, 14-15,000 ft. Dry rocks. 1913. F. Kingdon Ward. No. 1090.

(2) Yunnan : Crassulacée vivace. Rochers de haute plateau de Ie-ma-tch'ouan. Alt. 3200 m. Août. E. E. Maire, No. 1052/1913.

(3) Yunnan : Mountains of the Chungtien Plateau. Lat. $27^{\circ} 30'$ N. Alt. 11,000 ft. Plant of 1-2 inches, flowers pale yellow. On rocks and humus-covered boulders. July 1914. G. Forrest, No. 12,757.

(4) Yunnan : Yung-peh Mountains. Lat. $26^{\circ} 42'$ N. Alt. 8000 ft. Succulent plant of 3-6 inches. Flowers yellowish-white. On rocks and dry stony pasture. Sept. 1918. G. Forrest, No. 16,911.

These all represent the same plant or plants which M. Hamet (*supra* v, 119) named *S. trifidum*, vars. *Balfouri* and *Forresti*, but later (*supra* viii, 140, 142) placed as varieties of *S. linearifolium*, Royle. He does not state his reasons for this change of species, and the varieties are based mainly on the shape of the sepals. In the Himalayan *trifidum* the sepals are very inconstant in shape, varying from small triangular $\frac{1}{5}$ as long as the petals to long, linear, equalling the petals; the sepals of *trifidum*

appear to offer no characters to distinguish that species from *linearifolium*. The petals of *trifidum* are variable also though to a less extent, and are usually, but not always, narrower than those of *linearifolium*. Much the best character by which to separate the two species is the leaves, which in *trifidum* are aggregated at or near the top of the stem, and though very variable in shape are generally very much broader and more deeply toothed than those of *linearifolium*, in which they are scattered along the stem, linear or nearly so, and entire or slightly toothed. On this showing, Hamet's two varieties ought to remain under *trifidum*; they have the leaves of that species, the sepals are untrustworthy, and the petals in specimens named by him are in some cases as narrow. The two varieties besides seem rather close together for so variable a plant.

S. variicolor, Praeger.

(1) Yunnan : Sedum annuel. Fl. jaunes d'ocre. Toitures de Tong-tch'ouan. Alt. 2500 m. Novembre. E. E. Maire.

(2) Yunnan: Sedum vivace. Fleurs et tiges jaunes. Rochers au pied des montagnes à Tong-tch'ouan. Alt. 2500 m. Octobre. E. E. Maire. No. 1150/1913.

(3) Yunnan, 1913. E. E. Maire, No. 563/1913.

Hamet in Herb. Léveillé (now in Herb. Edinburgh) names several sheets of this plant *S. leucocarpum*, Franch. But I cannot make *S. variicolor* (which I have had in cultivation for some years) agree with Franchet's description, particularly as regards the furfuraceous young leaves and stems, the fuscous coriaceous scales at base of the branches, and the ivory-white follicles, which he states to be very remarkable. My plant is quite glabrous and green, devoid of scales, and the fruit turns merely whitish when dead, as in most Sedums. I therefore retain the name *variicolor* till I have had an opportunity of examining Franchet's type.

Sedum venustum, Praeger, sp. nov. (Plate clxxix).

S. Smithi, Hamet ex descriptione est subsimile, sed *S. venustum* squamis caudicis brevibus in caudam linearem haud prolongatis, foliis oblanceolatis (nec longe ovatis vel ovato-sublineari-bus) marginibus papillatis (nec integris), caulinibus subasperis (nec glabris), staminibus 6-7 mm. (nec 2.9-5.4 mm.) longis, squamis nectariferis 1 mm. (nec .4-.65 mm.) longis, differt.

Herba perennis, subglabra, caules steriles non edens. *Caudex* erectus, plerumque simplex, crassus (ad 10 mm.), caulinibus emarginatis dense obtectus, apice caules floriferos basi squamis

cinctos ferens. *Squamae* deltoideae, suborbicularares, acuminatae, paleaceae. *Caules* annui, numerosi, erecti, simplices, foliosi, 5–12 cm. longi, papillis minutis sparsis subasperi. *Folia* alterna, plana, supra subtusque glabra, internodiis longiora, breviter petiolata vel subsessilia, basi attenuata, in calcar non producta, oblanceolata vel elliptica, marginibus mammillatis, apice obtusa vel acuta, 6–12 mm. longa, 3–4.5 mm. lata. *Inflorescentia* terminalis, foliosa, 6–10 mm. longa, 10–15 mm. lata, e flore mediano et ramis floriferis 3–4 composita; rami bracteati, florem terminalem et saepe flores binos oppositos vel ramulos 2-floros oppositos ferentes; flores pedicellati, pedicellis mammillatis circa 4 mm. longis, quam flores brevioribus; bracteae foliis similes, inferiores folia aequantes, superiores minores. *Flores* plerumque 5-meri, saepe 4-meri, campanulati, pulchre rosei vel flavescentes. *Flos* ♂: *Sepala* libera, deltoideo-lanceolata, obtusa vel subacuta, 3–4 mm. longa, basi 1.5 mm. lata, apice purpurea. *Petala* suberecta, oblongo-lanceolata, obtusa, 5 mm. longa, 1.5 mm. lata, nervo medio in mucronem apicem superantem prolongato. *Stamina* 10 vel 8, erecta, 6–7 mm. longa, epipetala quadrante adnata. *Squamae nectariferae* subquadrate, minute emarginatae, circa 1 mm. longae et latae. *Carpella* erecta, gracilia, cum stylis 4.5 mm. longa; styli longi erecti. *Flos* ♀: *Sepala* longe deltoidea, obtusa, 3 mm. longa, basi 1 mm. lata. *Petala* anguste oblanceolata, obtusa, 5 mm. longa, 1.5 mm. lata. *Squamae nectariferae* subquadrate, emarginatae, 1 mm. longae, .75 mm. latae. *Carpella* erecta, 8 mm. longa, stylis suberectis, stigmatibus capitellatis.

(1) E. Tibet: Doker-la, forming big cushions among boulders, 16,000 feet. 1913. F. Kingdon Ward, No. 764. ♂ plant.

(2) Yunnan: Mekong-Salwin divide. Lat. $28^{\circ} 12'$ N. Alt. 14,000 ft. Aug. 1917. Plant of 2–4 inches. Flowers yellow, flushed rose. On ledges and in crevices of cliffs. G. Forrest, No. 14,592. (♂ plants).

(3) W. Yunnan: On moss-covered boulders in shady situations on the eastern flank of the Tali Range. Lat $25^{\circ} 40'$ N. Alt. 9–11,000 ft. Sept. 1906. G. Forrest, No. 5054. (Recorded as *S. fastigiatum*, H.f. et T. vel aff. in Notes R. Bot. Gard. Edinb. vii, 293). (Female plant).

(4) Sikkim: Dzalep la. Alt. 14,000 ft. 4.7.13. Yellow, among boulders and scree. R. E. Cooper, No. 152. (Male plant). (I think *venustum*, but towards *fastigiatum*).

(5) Upper Burma: Chimili Alps, 12–13,000 feet. Aug. 3, 1919. Sedum sp. Very abundant on high alpine cliffs and lawns. Flowers dull yellow, fading in fruit to rich blood red. R. Farrer, No. 1189. (Female plant).

An additional station may be added from the Kew Herbarium:—

(6) West Szechuan and Tibetan Frontier, chiefly near Tachienlu, 9000–13,500 feet. Sedum. Coll. A. E. Pratt, No. 60. (This is a female plant, a tall untidy form with the only branched rhizome seen in the whole series examined).

Hooker and Thomson (Journ. Linn. Soc. Bot., ii, 98) describe *S. fastigiatum* as having linear leaves. Clarke (in Hooker Flora Brit. India, ii, 419) says leaves linear-oblong, stems and leaves glabrous, cymes puberulo-pubescent. Two plants of *fastigiatum* which I have grown were wholly glabrous. *S. venustum* in flower closely approaches *fastigiatum*, but the leaves are oblanceolate or elliptic (up to $\frac{1}{2}$ as broad as long), the stems roughened with papillae, and the cymes and bracts usually conspicuously mammillate. *S. fastigiatum* appears concentrated on if not confined to the Himalayas (I have not seen Forrest 6029, which M. Hamet records as *fastigiatum*), while *S. venustum* ranges over the region where Tibet, Yunnan and Burma meet. The species of this group are variable, and when not typical difficult to name, especially from dried material.

S. viscosum, Praeger.

Evidently a common plant in Southern China. It is the *S. drymarioides* var. *stellariaefolium* of Hamet (Forrest 197, Henry 4908, and Carles, Peking Hills, in Notes R.B.G. Edinb., viii, 139, etc.) While typical *drymarioides* and typical *viscosum* are very different, intermediates exist, and probably they are best considered as extremes of an aggregate species. But *stellariaefolium* is not a good name for my plant, being described by Franchet as having whitish small flowers like typical *drymarioides* (sepals 1 mm., petals 3 mm.) while in *viscosum* they are golden and large (sepals 2 mm., petals 5–5.5 mm).

S. viviparum, Maxim.

Korea:—Quelpaert: Hallaisan, July 1910. E. J. Taquet, No. 4251.

S. yunnanense, Franchet var. *Forresti*, Hamet.

(1) Szechuan: In rupest. schistos. in summo mont. supra Huali, alt. circiter 4200 m. May 27, 1914. C. Schneider, No. 1414.

(2) Szechuan: In reg. Knapic prope Molien, in saxosis. Alt. circiter 3000 m. May 25, 1914. C. Schneider, No. 3543.

(3) Yunnan: Mekong-Salwin divide. Lat. $26^{\circ} 30' N.$ Alt. 12,000 ft., July 1919. Plant of 6-10 inches. Flowers yellow, flushed crimson exterior. On ledges of cliffs and scree. G. Forrest, No. 18,187. (An extreme form, with linear almost entire leaves and very leafy inflorescence).

A fourth specimen collected by Maire at Ta-hai-tse plateau, Yunnan (No. 461/1913), has the narrow purple leaves of var. *Forresti*, but they are nearly entire as in var. *valerianoides*.

S. yunnanense, Franchet var. *valerianoides*, Hamet.

A common plant in Yunnan. Leaves usually very broad, but vary from orbicular to lanceolate. Inflorescence usually very broad, especially in the male plant.

EXPLANATION OF PLATES.

Illustrating Mr Lloyd Praeger's paper on some Asiatic Sedums.

PLATE CLXX.—1. *S. ambiguum*, sp. nov. *a*, flowering plant, $\times 1$. *b*, barren plant, $\times 1$. *c*, flower, $\times 6$. *d*, sepal, petal, stamen, carpel, scale, all $\times 6$.

2. *S. atuntsuense*, sp. nov. *a*, plant, $\times 1$. *b*, leaf, $\times 3$. *c*, flower, $\times 3$. *d*, sepal, petal, stamen, scale, carpel, all $\times 6$.

CLXXI.—1. *S. Barnesianum*, sp. nov. *a*, plant, $\times 2$. *b*, caudex-leaf, $\times 4$. *c*, stem-leaf, $\times 4$. *d*, flower, $\times 4$. *e*, sepal, petal, stamen, scale, carpel, all $\times 4$.

2. *S. Cretini*, Hamet, female plant. *a*, plant, $\times 1$. *b*, leaves, $\times 3$. *c*, flower, $\times 3$. *d*, sepal, *e*, petal, *f*, scale, *g*, carpel, all $\times 6$.

CLXXII.—1. *S. Leveilleanum*, Hamet. *a*, plant, $\times 2$. *b*, caudex-leaf, $\times 6$. *c*, flower-stem, $\times 4$. *d*, stem-leaf $\times 6$. *e*, sepal, *f*, petal, both $\times 9$.

2. *S. concinnum*, sp. nov. *a*, plant, $\times 2$. *b*, flower, $\times 6$. *c*, sepal, stamen, petal, scale, carpel, all $\times 12$.

CLXXIII.—1. *S. discolor*, Franchet. *a*, plant, $\times 1$. *b*, male flower, $\times 8$. *c*, sepal, petal (front and side view), stamen, scale, carpel, of male flower, all $\times 8$. *d*, hermaphrodite flower, $\times 8$. *e*, sepal, petal, stamen, carpel, scale, of hermaphrodite flower, all $\times 8$. *f*, leaves, $\times 2$. *g*, female flower, $\times 8$. *h*, sepal, petal, scale, of female flower, all $\times 8$.

CLXXIV.—1. *S. horridum*, sp. nov. *a*, plant, $\times 1$. *b*, flowering shoot, $\times 1$. *c*, leaves, $\times 3$. *d*, male flower, $\times 3$. *e*, sepal, petal, carpel, scale, stamen, of male flower, all $\times 6$.

2. *S. pseudostaphii*, sp. nov. *a*, flowering plant, $\times 1$. *b*, barren plant, $\times 1$. *c*, flower, $\times 6$. *d*, sepal, petal, carpel, stamen, scale, all $\times 9$.

3. *S. Staphii*, Hamet, flower, $\times 1$.

CLXXV.—1. *S. trientaloides*, sp. nov. *a*, plant, $\times 1$. *b*, flower, $\times 3$. *c*, sepal, petal, stamen, carpel, scale, all $\times 6$.

2. *S. longistylum*, sp. nov. *a*, plant, $\times \frac{1}{2}$. *b*, inflorescence, $\times 1$. *c*, flower, $\times 3$. *d*, sepal, $\times 6$. *e*, petal, $\times 6$. *f*, stamen, carpel, scale, all $\times 6$.

Explanation of Plates.—continued.

CLXXVI.—*S. macrocarpum*, sp. nov. *a*, plant, $\times 1$. *b*, female flower, $\times 3$. *c*, petal, sepal, scale, carpel, of female flower, all $\times 6$. *d*, male flower, $\times 3$. *e*, sepal, petal, carpel, scale, stamen, of male flower, all $\times 6$.

CLXXVII.—1. *S. mekongense*, sp. nov. *a*, plant, $\times 1$. *b*, leaf, $\times 3$. *c*, flower, $\times 3$. *d*, sepal, petal, carpel, stamen, scale, all $\times 6$.

2. *S. orichalcum*, W. W. Sm. *a*, plant, $\times 1$. *b*, *b*, root-leaves, $\times 1$. *c*, stem-leaf, $\times 1$. *d*, flower, $\times 3$. *e*, sepal, petal, stamen, carpel, scale, all $\times 6$.

CLXXVIII.—*S. robustum*, sp. nov. *a*, plant, $\times 1$. *b*, male flower, $\times 3$. *c*, sepal, petal, carpel, stamen, of male flower, all $\times 6$.

CLXXIX.—*S. venustum*, sp. nov. *a*, male plant, $\times \frac{1}{2}$. *b*, flowering shoot of ditto, $\times 1$. *c*, leaf, $\times 3$. *d*, male flower, $\times 3$. *e*, petal, sepal, stamen, carpel, scale, of male flower, all $\times 6$. *f*, female flower, $\times 3$. *g*, petal, sepal, carpel, scale, of female flower, all $\times 6$.